EXPRESS MAIL LABEL NO.
EF349971684US

INLET SEAL ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to chromatography, and more particularly concerns a new inlet seal assembly and method for use with gas chromatography instruments.

2. Description of the Prior Art

The prior art inlet seal member which is used to make a leak free seal between an injection port member of a split/splitless injector and a reducing nut is made from stainless steel and may be coated with some material, i.e., gold, silver, etc. The seal is made by placing an inlet seal member in a reducing nut which has female threads that thread into male threads on the outer surface of the injection port member. The bottom surface of the injection port member has a small raised circular sealing ring of metal, and the seal is made by tightening the reducing nut which holds the inlet seal member to cause the raised circular sealing ring on the injection port member to cut into the top surface of the inlet seal member and make a metal to metal seal.

This prior art arrangement has a number of problems. For example, excessive torque must be used to achieve a leak free seal between the top surface of the inlet seal member and the sealing ring. Also, the injection port member and the inlet seal member must be machined to tight tolerances to

insure squareness on both the injection port circular sealing ring and the inlet seal member upper surface or the integrity of the seal is compromised.

Also, the injection port circular sealing ring may become scratched, dented, or otherwise damaged and this compromises the seal.

SUMMARY OF THE INVENTION

It is an object of the invention to overcome the disadvantages of the prior art and to provide a new inlet seal assembly to allow easier and more reliable sealing of the injection port member. The new inlet seal assembly incorporates a soft sealing surface ring on the upper and/or bottom surface of the inlet seal member to allow for easier compression of the metal sealing ring to the face of the inlet seal member. The new seal assembly incorporates a secondary machine surface, a soft peripheral ring on the upper surface of the inlet seal member, which allows for placement of a secondary material, such as Teflon, Graphite, Nickle, Silver, Copper, Viton, Lead, or Vespel, which is a trademark of E.I. Du Pont de Nemours Corporation, Wilmington, Delaware, and this compressible material is added to the inlet seal member at the circle where the seal occurs.

This new arrangement of the inlet seal assembly, which incorporates a soft material composition, such as Vespel, enables us to achieve a better and more reliable seal between the injection port metal sealing ring and the inlet seal member even though the metal sealing ring surface may have become

dented, scratched, or otherwise damaged. The new inlet seal assembly also allows for sealing under minimal torque conditions.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded view in front elevation of an inlet sealing ring assembly of the prior art;

Fig. 2 is a view in top plan of the inlet seal member of Fig. 1;

Fig. 3 is a view in section taken as shown by the arrows 3-3 in Fig. 2;

Fig. 4 is a view in side elevation of the inlet seal member of Fig. 3;

Fig. 5 is a view in side elevation of the injection port member;

Fig. 6 is a view in bottom plan of the injection port member and shows the metal sealing ring;

Fig. 7 is a view in section of the injection port member and shows the metal sealing ring;

Fig. 8 is an assembled view of the prior art inlet seal assembly including the injection port member, the inlet seal member, and the reducing nut member which is screwed on to the injection port member;

Fig. 9 is a view in top plan of the new inlet seal member;

Fig. 10 is a view in side elevation of the inlet seal member of Fig. 9 and shows the peripheral groove in the inlet seal member;

Fig. 11 is a view in section of the inlet seal member taken as indicated by the lines and arrows 11-11 of Fig. 9;

Fig. 12 is a view in top plan of the soft Vespel ring for the new inlet seal member;

Fig. 13 is a view in top plan of the new inlet seal member;

Fig. 14 is a view in side elevation of the new inlet seal member; and

Fig. 15 is a view in cross section of the new inlet seal member;

Fig. 16 is an exploded view in front elevation of an inlet sealing ring assembly of the invention; and

Fig. 17 is an assembled view of the inlet seal ring assembly.

DETAILED DESCRIPTION

Turning now to the drawings, there is shown in Fig. 1 a prior art inlet seal assembly 21 for sealing an injection port member 23 which includes injection port member 23 having a bottom surface 25 with a raised metal sealing ring 27. An inlet seal member 29 is provided with an upper surface 31 and the metal sealing ring 27 digs into the upper surface 31 to make a seal which may not be effective if the ring 27 or surface 31 is damaged.

The new inlet seal member 29a (Fig. 9-12) includes a peripheral groove 33 formed in the periphery of the inlet seal member 29a. A soft Vespel ring 37 is positioned in the peripheral groove 33 opposite the raised metal sealing ring 27 of injection port member 23. A reducing nut 39 forms a cup-like chamber which holds the inlet seal member 29a, and threads 41 and 43 connect the reducing nut 39 to the injection port member 23 whereby turning the reducing

nut 39 presses the soft vespel ring 37 of the inlet seal member 29a against the raised metal sealing ring 27 to form a seal between the inlet seal member 29a and the injection port member 23.

In operation, the method of sealing an injection port member 23 in a gas chromatography machine is by providing an injection port member 23 having a bottom surface 25 with a raised metal sealing ring 27. An inlet seal member 29a is provided with an upper surface 31, and a peripheral groove 33 is formed in the upper surface 31 of the inlet seal member 29a. The peripheral groove 33 is filled with a soft Vespel resinous material to form a soft Vespel resinous material ring 37. A seal 30 is formed between the injection port member 23 and the inlet seal member 29a by pressing the raised metal sealing ring 27 into the Vespel ring 37 by turning the reducing nut 39 on its threads. The seal is formed by tightening the threads between the reducing nut 39 and injection port member 23. A preferred embodiment of the invention is provided with a washer 45, as shown in Figs. 16 and 17, between the inlet seal member 29a and the reducing nut 39.

When the inlet seal assembly is assembled, gas or liquid is ejected from the injection port member 23 through the opening 40 in the inlet seal member 29a and through the opening in reducing nut 39.

Ring 27 is preferably circular but it may assume other shapes, if desired. The word "ring" as used herein is meant to include those other shapes, such as square, or rectangular, etc. Also, the word "fluid" as used herein is meant to

include liquid an/or gas.